



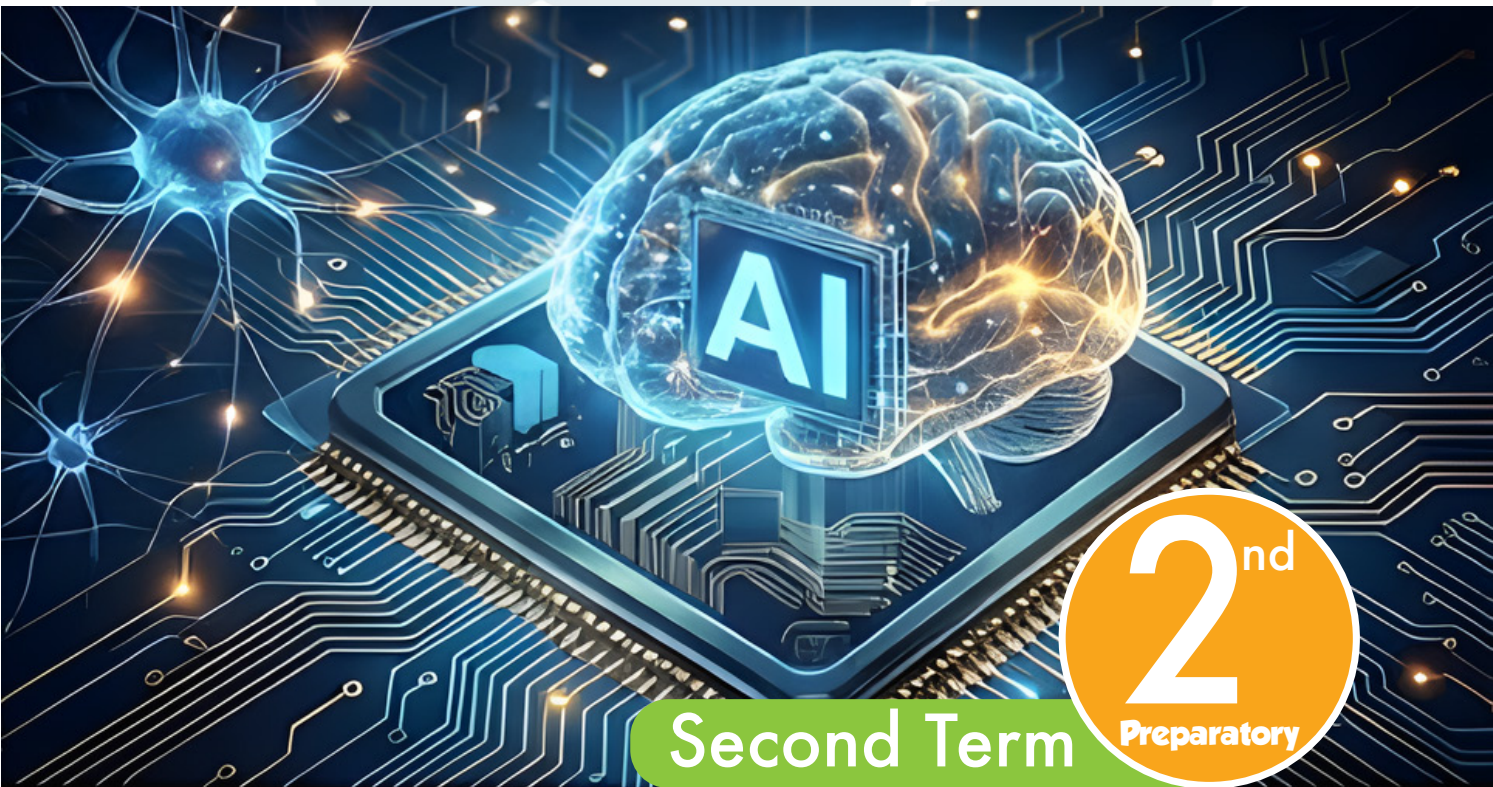
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ICT

Monthly Revision of February and March

By

Gamal Abdelnaser Rezk



2nd

Second Term

Preparatory

Summary

of Unit 3

Lesson 1

1 The Dream of Thinking Machines that operating automatically.

» Ancient civilizations made efforts to invent "thinking machines" and build machines work on their own (Automation systems).

» These efforts were not AI as we know today

2 The Modern Era of Artificial Intelligence.

1 Alan Turing (The Father of AI):

» In 1950, he founded modern AI and asked, "Can machines think?"

» **The Turing Test:** if a person chatting via text cannot tell if they are talking to a human or a computer, the program passes the test.

2 The Dartmouth Conference (1956):

» A gathering of the smartest scientists met in USA.

- **The Goal:** To develop machines that could learn and think like humans.

- **The Result:** The term "Artificial Intelligence" was officially born here.



3 Years of Excitement and Great Hopes (1956 - 1970)

» Scientists created the first AI programs

- 1- **Logic Theorist:** Solve logical mathematical problems.

- 2- **General Problem Solver:** try to solve general problems step-by-step.

» **Early Challenges:** Computers were very slow with limited memory; they need hours to solve a simple math problem.

4 Expert Systems: Learning from Experts (1970 - 1980)

» Scientists decided to teach machines special knowledge from experts.

» MYCIN (The Robot Doctor): A famous system used to diagnose infectious diseases.

- It asked questions about symptoms (like fever).
- It suggested treatments with accuracy as good as expert doctors.

5 AI Winter: When Dreams Faded (1980 - 1990):

» AI faced a major crisis, and the great initial excitement turned into disappointment due to:

- **Overstated Promises:** Scientists promised more than they could deliver.
- **Technical Limitations:** Computers were still slow and had limited memory.
- **High Cost:** Developing these systems was very expensive.
- **Limited Results:** Programs only worked in very narrow fields.
- **Lesson learned:** Scientists learned that AI is harder than they thought and requires patience.

6 The Renaissance: The Return of Hope (1990 - 2010)

» **The Internet & Data Revolution:** The appearance of the Internet provided huge amounts of data.

» **Machine Learning:** A new way where machines learn for themselves from data.

» **Amazing Achievements:** The computer beat the world chess champion, for the first time

7 The Modern Revolution: Deep Learning (2010 - Now)

» **Deep Learning:** An advanced type of Machine Learning that mimics the human brain using **Artificial Neural Networks** (interconnected "neurons" that send and receive signals).

» **AlphaGo Success:** A computer won against the world champion in "**AlphaGo**", a Chinese game much more complex than chess.

**Lesson 2****» AI Examples in Daily Life:**

- **In Your Phone:** Voice assistants, facial recognition, and text prediction.
- **In Games:** Smart characters that interact and adapt with you.
- **On the Internet:** Smart search engines and personalized content suggestions.

» Artificial Intelligence: It is the ability of machines to "think," make decisions, and solve problems.

Or It is the ability of computer systems to simulate human abilities, such as:

- Learning from data.
- Making decisions.
- Solving problems.
- Understanding natural language.
- Recognizing patterns.

» Deeper Understanding of AI: AI can process huge amounts of data very quickly and search for relationships to make logical decisions.

» Comparison between Human Intelligence and Artificial Intelligence:

Artificial Intelligence	Human Intelligence
Pure Data Processing: No feelings, no emotions, and no self-awareness	Humans feel emotions like joy, sadness, love, and empathy.
Super Speed & Accuracy: It processes trillions of data points in seconds with high accuracy.	Humans create new ideas and solve problems in untraditional ways.
Logic and Pure Data: Decisions are based on programmed rules and data.	Humans understand jokes, sarcasm, hidden and complex social situations.



» Why is AI Important Today?

- AI is a powerful tool that solves big problems and makes life easier.

» Examples of AI in Our Daily Lives:

- **Language Models (GPT):** Programs can conduct natural conversations and assist with school homework. (Such as Chat GPT).
- **Smart Phones:** Improving photos automatically and instant text translation and image recognition.
- **Voice Assistants:** Siri, Alexa, and Google Assistant use Natural Language Processing to understand speech, convert voice to text, and execute requests.
- **Games:** Enemies that react intelligently to your movements and personalized tips to improve your skills.



Non-Player Characters (NPCs) use AI to choose the best strategies to attack or escape, learning from your moves to become more challenging.

- **Entertainment:**
- **Watch IT:** Suggests movies based on your watch history.
- **Spotify:** Discovers songs you like and organizes personalized playlists.
- **At Home:** 1- Smart lighting systems. 2- Smart vacuum.
- **Self-Driving Cars:** Vehicles that can drive themselves.

Lesson 3

- ### » Ethical Responsibility in AI Uses:
- AI is a powerful technology can change the world for the better, but it must be used wisely, ethically and responsibly to ensure safety for everyone.

» AI systems should follow the following rules:

- 1 **Fairness and Transparency:** AI systems should be fair and treat all people equally without discrimination based on race, gender, or religion (Justice for all).



- 2 Privacy and Data Protection:** Personal information must remain safe. No one has the right to use your data without your permission. read the privacy settings of any application you use.

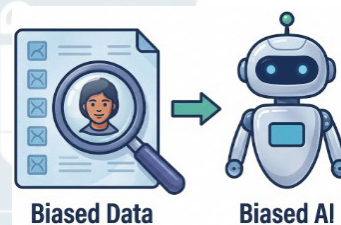
3 Human Supervision and Control:

AI is powerful, but it is still a tool that must be controlled by humans.

- Humans Set the Goals and create the algorithms.
- Important decisions that affect people's lives, such as:
 - 1 Critical medical decisions.
 - 2 Judicial rulings.
 - 3 National security.
- These must always be made by humans because humans have:
 - 1 Awareness.
 - 2 Ethics.
 - 3 Empathy.
 - 4 The ability to understand complex social cultural situations.
- Humans set the values and principles that AI systems must follow.
- Humans are the leaders and the final decision-makers.

4 The Problem of Bias in AI:

- Bias happens when an AI system "learns" unfair patterns from the data it is given.
- If a system is trained on incomplete or unfair data, its decisions will be biased.
- Developers must use high-quality, fair, and diverse data when training AI systems to ensure fairness and accuracy in AI results.



» How to be a Responsible "Smart User"

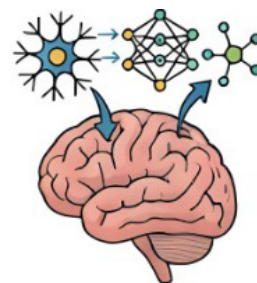
- 1 **Think Critically:** Do not trust everything AI produces automatically.
- 2 **Verify Information:** Learn how to ensure the accuracy of information.
- 3 **Use AI responsibly:** Use technology to improve your life and the lives of others.



Lesson 4

» Scientists created Artificial Neurons inside computers to help machines "think" and make decisions.

» **Artificial Neuron:** It is a small unit inside the computer that tries to imitate how humans think and learn.



» **Components of an Artificial Neuron :** It consists of 5 main parts:

- 1 **Inputs:** The data that enters the cell (e.g., image, sound, or number).
- 2 **Weights:** Numbers that help the neuron determine the importance of each piece of information.
- 3 **Bias:** A number added to the total to adjust the final result.
 - **Benefits:** It makes the neuron more flexible. It allows the cell to produce results even if inputs are zero.
- 4 **Activation Function:**
 - This is the "Decision Maker."
 - It calculates the sum of $(Inputs \times Weights + Bias)$.
 - It decides whether the cell should send a signal (Turn ON) or not.
- 5 **Output:** The final result or signal sent out by the neuron.

» **Most Famous Activation Functions:**

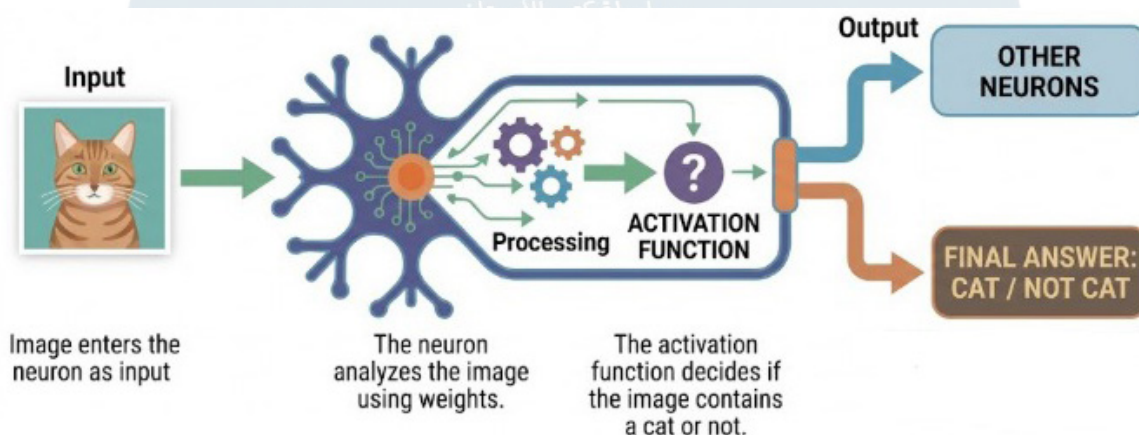
Name	Function	Example
Threshold	It tells the cell: If the value is greater than a certain number, the result = 1. If it is less or equal, the result = 0	- Imagine an exam out of 100, and passing is 50. If you get 60, "Pass" - if you get 40, "Fail". - It Gives Yes or No.
Sigmoid	This function gives a ratio or probability between 0 and 1	- The computer analyzes an image and says: "Probability this is a cat 85%. If the ratio is high, we trust the decision. - It Gives ratio or probability.
ReLU	It gives the same value if it's positive but if it's negative, it change it to zero.	- A strong sound is recorded. - a very weak sound is ignored.

**Lesson 5****» Artificial Neural Networks (ANNs):**

- The power the most advanced AI today.

» How to Build an Artificial Neuron:

- To build an artificial neuron, we need to:
 - 1 Identify the **type** of input data (such as numbers or images).
 - 2 Give a **weight** to each input
 - 3 Multiply each input by its weight, then add the results together.
 - 4 Send the result to the activation function
 - 5 Get the final output, which represents the decision or prediction.

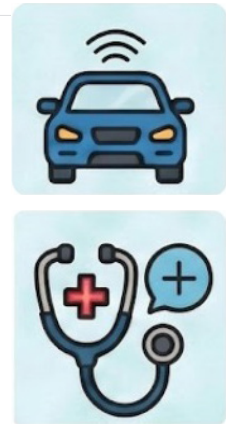
**» How are neurons used in Artificial Intelligence ?**

- When we connect thousands of artificial neurons together, we get a powerful **neural network** that can:
 - 1 Learn from experiences.
 - 2 Improve its performance over time.
 - 3 Solve complex problems such as self-driving cars or diagnosing diseases.



» Real-Life applications of artificial neuron:

- Smart assistants like Siri and Alexa
- Smart cameras that recognize faces.
- Self-driving cars.
- Instant translation between languages.
- Diagnosing diseases in hospitals.
- Suggesting movies on platforms like YouTube.



Lesson 6

» **Data Analysis:** It is the process of inspecting, cleaning, and transforming data to extract useful information and make fact-based decisions.

» Using Python for Data Analysis:

- Python is one of the best programming languages for data analysis because:

- 1 **Easy to learn and use:** Its simple syntax makes it suitable for beginners.
- 2 **Powerful libraries such as:**
 - **Pandas:** Used for data processing and manipulation.
 - **NumPy:** Used for scientific and mathematical calculations.
 - **Matplotlib & Seaborn:** Used for data visualization (graphs).
- 3 **Large Support Community:** Many educational resources are available.
- 4 **Compatibility:** Works perfectly with AI and Machine Learning.

» Basic Concepts in Data Analysis:

- 1 **Mean (Average):** It is the sum of values divided by their count.
 - **Python Example using NumPy:**

```
Python - Prep2
x
1. import numpy as np
2. data = [10, 20, 30, 40, 50]
3. mean = np.mean(data)
4. print("The Mean is :", mean)
```



- **Note:** The result is usually a **float** (decimal number), even if the result is a whole number.

2 Maximum and Minimum Values:

- **Max ():** The largest value in the dataset.
- **Min ():** The smallest value in the dataset.

» Python Example:

maximum = np.max(data).

minimum = np.min(data).

3 Types of Data can be Analyzed:

1- Numerical Data:

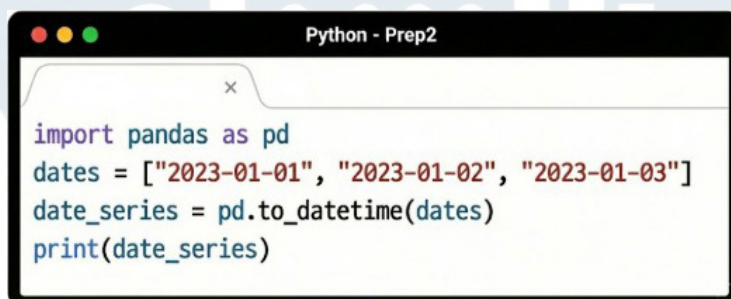
- **Integers:** Whole numbers (e.g., age, product count).
- **Decimals:** Numbers with fractions (e.g., weight, price).

2- Text Data: Comments or articles, analyzed using ULP.

3- Date and Time: Specific dates analyzed using the Pandas library.

4 Data Analysis with Pandas:

- To perform operations like calculating the time between two events, text dates must be converted into **DateTime objects**.
- **Python Example:**



```
import pandas as pd
dates = ["2023-01-01", "2023-01-02", "2023-01-03"]
date_series = pd.to_datetime(dates)
print(date_series)
```

» Why use pd.to_datetime()?

- **Time Operations:** They allow you to calculate the period between dates or extract specific parts (Day, Month, Year).
- **Data Validation:**
It automatically rejects incorrect dates (like "2023-13-01") that don't exist.
- **Grouping:** It helps group data (e.g., calculating total sales per month).

February and March Model Exams

Model Exam

1

1 Choose the correct answer:

- 1 What is the element that artificial intelligence does not have but humans do?
 - a. The ability to store data.
 - b. The ability to learn.
 - c. The ability to feel and understand values.
 - d. The ability to analyze numbers.
- 2 What is an artificial neuron?
 - a. Program to run games.
 - b. Unit that tries to imitate human thinking.
 - c. Part of computer memory.
 - d. Real biological cell.
- 3 What is the basis for building what is known as artificial neural networks?
 - a. Complex algorithms.
 - b. The artificial neuron.
 - c. Intelligent assistants.
 - d. The instant translation function.
- 4 Which library is used to perform mathematical calculations like the mean?
 - a. NumPy
 - b. Matplotlib
 - c. Siri
 - d. Excel
- 5 Which part of the cell helps it make a decision even when inputs are zero?
 - a. Inputs.
 - b. Weights.
 - c. Bias.
 - d. Input function.
- 6 AI systems become "biased" when they are trained using
 - a. too much data
 - b. very fast computers
 - c. incomplete or unfair data
 - d. diverse and fair data
- 7 From the examples of using AI on the Internet:
 - a. Changing the screen color.
 - b. Suggesting appropriate content.
 - c. Blocking the Internet.
 - d. Increasing browser speed.

2 Put (✓) or (X):

- 1 Artificial intelligence is used only in games and entertainment. ()
- 2 Smart devices in homes, such as the smart vacuum cleaner, rely on artificial intelligence. ()
- 3 Artificial intelligence can make critical decisions better than humans. ()
- 4 Artificial intelligence should be designed to be fair and just for everyone. ()
- 5 The artificial neuron tries to imitate the function of neurons in the human brain. ()
- 6 Inputs can be images, sounds, or numbers. ()
- 7 The neuron is the foundation upon which the structure of artificial neural networks is built. سلسلة كتب الاستاذ ()
- 8 Self-driving cars are not considered among the complex problems that powerful neural networks can solve. ()

Model Exam

2

1 Choose the correct answer:

- 1 Which library is used for data visualization in Python?
 - a. Pandas.
 - b. NumPy
 - c. Datetime.
 - d. Matplotlib.
- 2 The Sigmoid function works as?
 - a. Negative number.
 - b. Number between 0 and 1 (probability).
 - c. Random number.
 - d. Number greater than 100.

- 3 What is the step that follows determining the type of data and assigning a weight to each input in building the artificial neuron?
 - a. Obtaining the final output.
 - b. Passing the output to the activation function.
 - c. Summing the inputs after multiplying them by their weights.
 - d. Analyzing the image using the weights.
- 4 What is the benefit of `pd.to_datetime()`?
 - a. Converting text into numbers.
 - b. Converting text dates into a time format.
 - c. Deleting dates.
 - d. Sorting data automatically.
- 5 Artificial neurons technology are used in:
 - a. Analyzing fixed product prices.
 - b. Identifying product prices manually.
 - c. Displaying a list of all old prices.
 - d. Predicting the weather or prices.
- 6 is the basic building unit of Neural Networks.
 - a. Instant translation.
 - b. Screen brightness.
 - c. The artificial neuron.
 - d. Manual data entry.
- 7 Who makes important decisions in systems based on AI?
 - a. Only AI
 - b. Voice assistants.
 - c. Humans.
 - d. Robots.

2 Put (✓) or (X):

- 1 The idea of artificial intelligence is a modern concept that has appeared in recent years. ()
- 2 Artificial intelligence relies only on data processing without self-awareness. ()
- 3 The human is the final decision-maker because they possess ethics and awareness. ()
- 4 No entity has the right to use your personal data without your consent. ()

- 5 The weights in the neuron do not affect the final decision. ()
- 6 The step that precedes passing the output directly to the activation function is assigning a weight to each input. ()
- 7 The phone camera that improves photos automatically uses Artificial Intelligence. ()
- 8 Deep Learning means computer learns from mistakes. ()

Model Exam

3

1 Choose the correct answer:

- 1 How can artificial intelligence help solve the problem of traffic congestion?
 - a. Manufacturing more cars.
 - b. By analyzing data and intelligently organizing traffic flow.
 - c. By canceling traffic signals.
 - d. Disabling car movement.
- 2 Which of the following is an example of responsible use of artificial intelligence?
 - a. Using it to harm others.
 - b. Using it to improve people's lives.
 - c. Using it to spread rumors.
 - d. Using it without reviewing the data.
- 3 Which type of data can be analyzed using NLP?
 - a. Numerical data.
 - b. Images.
 - c. Text.
 - d. Dates only.
- 4 One real-life applications of artificial neurons related to content suggestion is
 - a. smart assistants like Siri.
 - b. face recognition cameras
 - c. suggesting movies on platforms like watch it.
 - d. self-driving cars.

- 5 What is the function of the Activation Function?
- a. Managing memory. b. Storing data.
c. Calculating weights. d. Making the final decision.
- 6 The ethical rule that states your data cannot be used without your permission is
- a. fairness b. privacy
c. responsibility d. transparency
- 7 Teaching a computer to play chess and win against the best players is an early example of
- a. machine learning b. 3D printing
c. the Internet d. using Office software

2 Put (✓) or (X):

- 1 The Turing test is a method to determine whether a machine can simulate human thinking. ()
- 2 Human intelligence possesses creativity while artificial intelligence imitates and does not innovate. ()
- 3 Robots can be programmed to make decisions based on data. ()
- 4 Bias helps the neuron to give results even in the absence of inputs. ()
- 5 Artificial neurons are used only in language translation and weather forecasting, and are not used in image recognition. ()
- 6 The idea of AI is a very modern idea that appeared in the last few years. ()
- 7 Artificial Intelligence can feel human emotions. ()
- 8 Bias in AI may happen due to incomplete or unfair data. ()

Model Exam

4

1 Choose the correct answer:

- 1 What is the best description of artificial intelligence?
 - a. Making machines faster and stronger.
 - b. Making machines larger in size.
 - c. Making machines think and learn like humans.
 - d. Making machines smaller in size.
- 2 The function `np.mean()` is used to calculate
 - a. the largest number.
 - b. the smallest number.
 - c. the mean.
 - d. summing two lists.
- 3 What is the main role of the activation function in an artificial neuron?
 - a. Decide the final decision (Yes/No).
 - b. Identify weights for each input.
 - c. Add the weighted inputs.
 - d. Entering the image as an input.
- 4 What is the function of Inputs in an artificial neuron?
 - a. Saving results.
 - b. Receiving information.
 - c. Sending decisions.
 - d. Deleting data.
- 5 If a facial recognition system only recognizes one race, this is an example of
 - a. fairness
 - b. bias
 - c. responsibility
 - d. privacy
- 6 Weights are used to
 - a. determine input importance .
 - b. decorate data.
 - c. store sounds.
 - d. run the activation function.
- 7 The Threshold function gives a "Pass" result if the value is
 - a. less than
 - b. equal to
 - c. greater than
 - d. both a and b



2 Put (✓) or (X):

- 1 Deep learning is an advanced type of machine learning. ()
- 2 Smart search engines like Google do not rely on artificial intelligence. ()
- 3 Using artificial intelligence to improve the lives of others is responsible use. ()
- 4 The activation function is responsible for executing the final decision of the neuron. ()
- 5 The activation function is the one that analyzes the image using the weights in the example of recognizing a cat. ()
- 6 The Threshold function gives values between 0 and 1 only. ()
- 7 An artificial neuron can give a result even when inputs are zero. ()
- 8 The final goal of an artificial neuron is to obtain the final output which represents a decision or prediction. ()

Model Exam

5

1 Choose the correct answer:

- 1 Artificial intelligence is characterized by
 - a. It has feelings.
 - b. Free artistic creativity.
 - c. It has self-awareness.
 - d. It processes data at a very high speed.
- 2 What is the function of the NumPy library?
 - a. Drawing charts.
 - b. Dealing with text.
 - c. Image analysis.
 - d. Scientific calculations.
- 3 The "Robot Doctor" program designed in the 1970s to diagnose infectious diseases was called
 - a. Logic Theorist
 - b. AlphaGo
 - c. MYCIN
 - d. Siri.

- 4 If a facial recognition system is trained using data from only one race, it will
- a. work efficiently for everyone. b. become faster.
c. improve in translation. d. fail to recognize other races.
- 5 Siri is an example of:
- a. Image processing. b. A voice assistant based on AI.
c. A drawing program. d. An Internet browser.
- 6 Calculation in a neuron is performed by the formula: (Inputs × Weights) +
- a. Output b. Activation
c. Ratio d. Bias
- 7 library is used for data processing and manipulation in Python.
- a. NumPy b. Matplotlib
c. Pandas d. Seaborn

2 Put (✓) or (X):

- 1 Machine learning is a branch of artificial intelligence that allows computers to learn from experience. ()
- 2 Artificial intelligence can understand sarcasm and emotions with the same accuracy as humans. ()
- 3 Part of the role of the smart user is critical thinking and verifying the accuracy of information. ()
- 4 Weights are always fixed values that do not change. ()
- 5 One of the practical applications of the artificial neuron is its use in diagnosing diseases in hospitals. ()
- 6 The np.mean() function is used to find the smallest value in a list. ()
- 7 pd.to_datetime() can reject invalid dates like "2023-13-01". ()
- 8 The print() function is used to display results on screen. ()

Answers

MODEL (1)

1 1 c 2 b 3 b 4 a
5 c 6 c 7 b

2 1 X 2 ✓ 3 X 4 ✓
5 ✓ 6 ✓ 7 ✓ 8 X

MODEL (2)

1 1 d 2 b 3 c 4 b
5 d 6 c 7 c

2 1 X 2 ✓ 3 ✓ 4 ✓
5 X 6 X 7 ✓ 8 X

MODEL (3)

1 1 b 2 b 3 c 4 c
5 d 6 b 7 a

2 1 ✓ 2 ✓ 3 ✓ 4 ✓
5 X 6 X 7 X 8 ✓

MODEL (4)

1 1 c 2 c 3 a 4 b
5 b 6 a 7 c

2 1 ✓ 2 X 3 ✓ 4 ✓
5 X 6 X 7 ✓ 8 ✓

MODEL (5)

1 1 d 2 d 3 c 4 d
5 b 6 d 7 c

2 1 ✓ 2 X 3 ✓ 4 X
5 ✓ 6 X 7 ✓ 8 ✓